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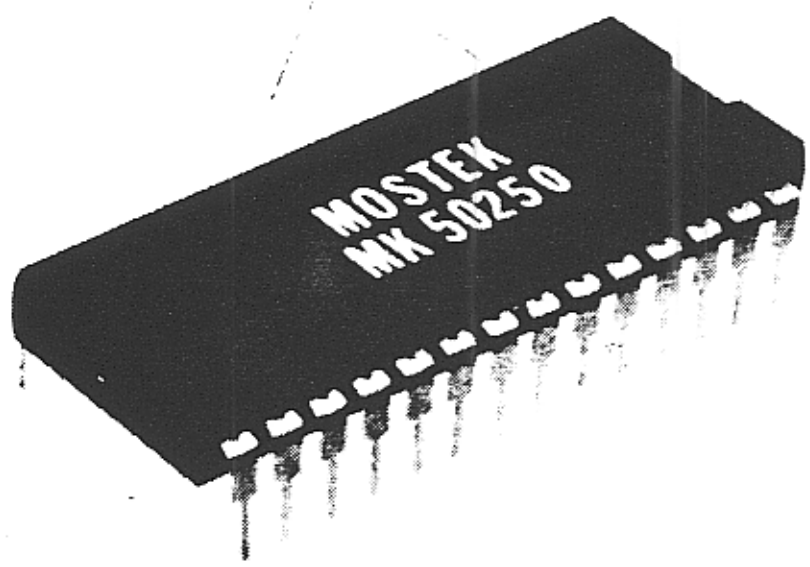
MOSTEK®

MOS DIGITAL ALARM CLOCK

MK50250(N) Series

FEATURES

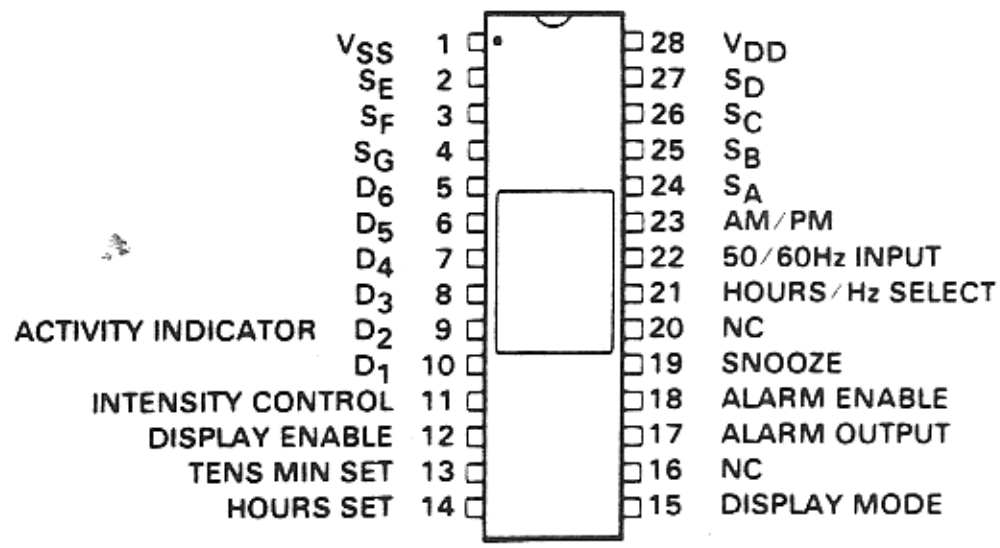
- Single Voltage Power Supply
- Intensity Control
- Simple Time Setting
- 4-or 6-Digit Display
- AM/PM and Activity Indicator
- Selectable Input Frequency and Output Mode
  - MK50250 — 12 hr/60Hz or 24 hr/50Hz
  - MK50253 — 12 hr/50Hz or 24 hr/50Hz
  - MK50254 — 12 hr/60Hz or 24 hr/60Hz
- 24 Hour Alarm
- Snooze Alarm



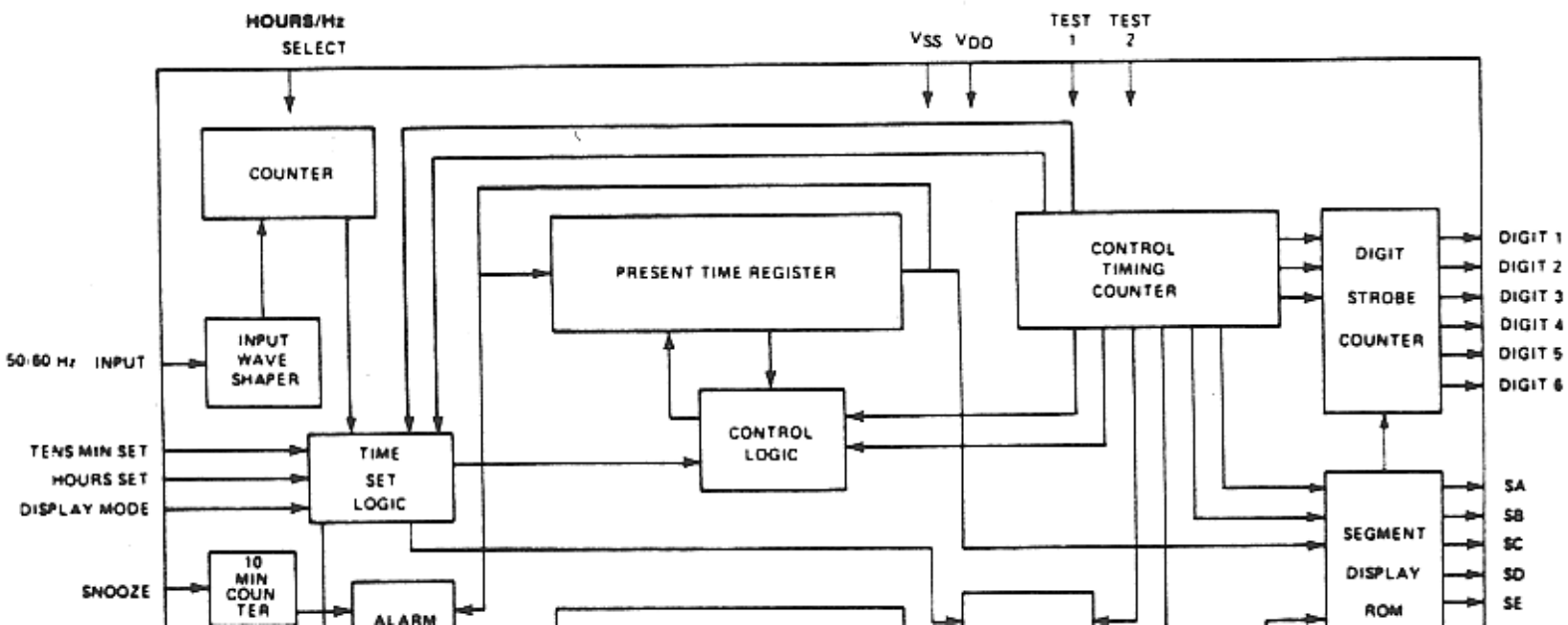
DESCRIPTION

The MK50250 is a versatile MOS/LSI clock circuit manufactured by Mostek using its depletion-load, ion implantation process and P-channel technology. The circuit can be used to construct a digital alarm clock with the addition of only a simple power supply, display, and standard interfacing components. (See Typical Circuit Configuration). The circuit is compatible with 4- or 6- digit seven-segment multiplexed displays. An AM/PM and circuit activity signal is generated by the chip. The alarm operates in a 24 hour mode, which allows the alarm to be disabled and immediately reenabled to activate 24 hours later. The snooze inhibits an activated alarm for 10 minutes.

PIN CONNECTIONS



FUNCTIONAL DIAGRAM



*ABSOLUTE MAXIMUM RATINGS OVER OPERATING FREE — AIR TEMPERATURE RANGE

Voltage on any pin relative to V_{SS} ..... +0.3 to -

Output-Voltage Breakdown on any output relative to V_{SS} ..... -18.0V @

Operating Free-Air Temperature Range ..... 0°C

Storage Temperature Range ..... -40°C to -

*Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of t these or any other condition above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for exter may affect device reliability.

RECOMMENDED OPERATING CONDITIONS ($0°C \leq T_A \leq 55°C$)

PARAMETER	MIN	MAX	UNITS	NO
Operating Voltage V_{DD} Relative to V_{SS}	-18.0	-9.0	V	
Input Logic Levels "1" Logic Level "0" Logic Level	V_{SS}-0.3 -18.0	V_{SS} +0.3 V_{DD} +0.5	V V	

ELECTRICAL CHARACTERISTICS ($9V \leq V_{SS} - V_{DD} \leq 18V$, $0°C \leq T_A \leq 55°C$)

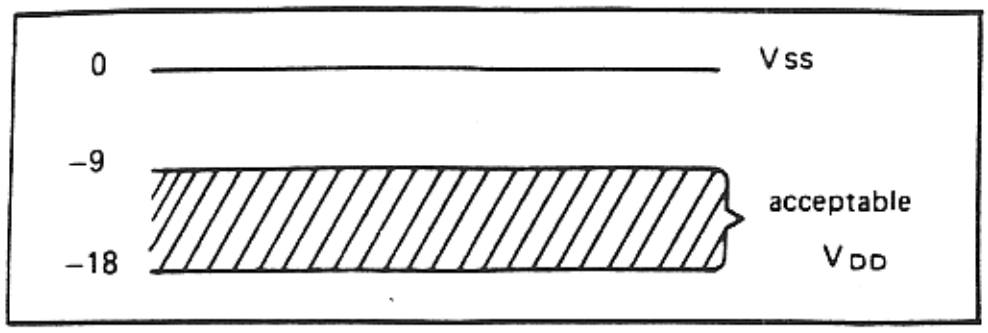
PARAMETER	MIN	MAX	UNITS	
Output Current S_A -S_G, D_6 -D_1, AM/PM "1" Logic Level "0" Logic Level	0.5		mA	
Alarm Output Current "1" Logic Level "0" Logic Level	0.5 -5.0		mA µA	
Supply Current, I_{DD}		10	mA	
Input Current Tens Min Set, Hours Set Hours/Hz Select Alarm Enable, Snooze 50/60Hz Input, Display Enable	50 5 5 -15	1000 100 100 -200	µA µA µA µA	

NOTES:

1. 50/60Hz Input has 3 volts of hysteresis for noise protection.
"Intensity" are three-state inputs which will self-seek third

OPERATION

The MK50250 requires a single power supply with a voltage range from $9V \leq V_{SS} - V_{DD} \leq 18$.



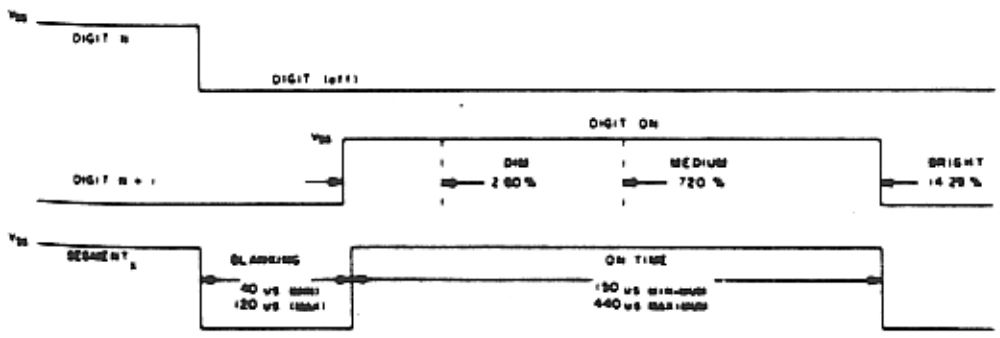
A Three-State Input is one of the features which Mostek has employed on the MK50250 to reduce system expense and simplify operation for the consumer. By switching Display Mode to one of three possible states the mode of operation is as follows:

Display Mode Input	Mode
V_{SS}	Alarm Set
Open	Real Time
V_{DD}	Count Inhibit

When in the Alarm Set mode, the alarm time is displayed and may be altered using the time set procedure (see setting). In the Real Time mode, the real time is displayed and may also be altered using the same procedure. Count inhibit halts the counting of the clock. The display shows the halted time and may be altered by the time set procedure.

The display outputs of the MK50250 require the use of seven-segment displays which can be multiplexed. The scanning oscillator is completely internal and requires no external components. As can be seen in the timing diagram, each digit is on 14.29% of the time required to scan all 6 possible digits when the intensity mode switch is on bright.

DISPLAY TIMING



NOTES:
1. Display scans digit 1 (unit secs) to digit 6 (tens hr.)
2. Segment polarity is programmable.
3. Blanking the linearly tracks digit on time.

The Intensity Control Input provides the following degrees of display intensity:

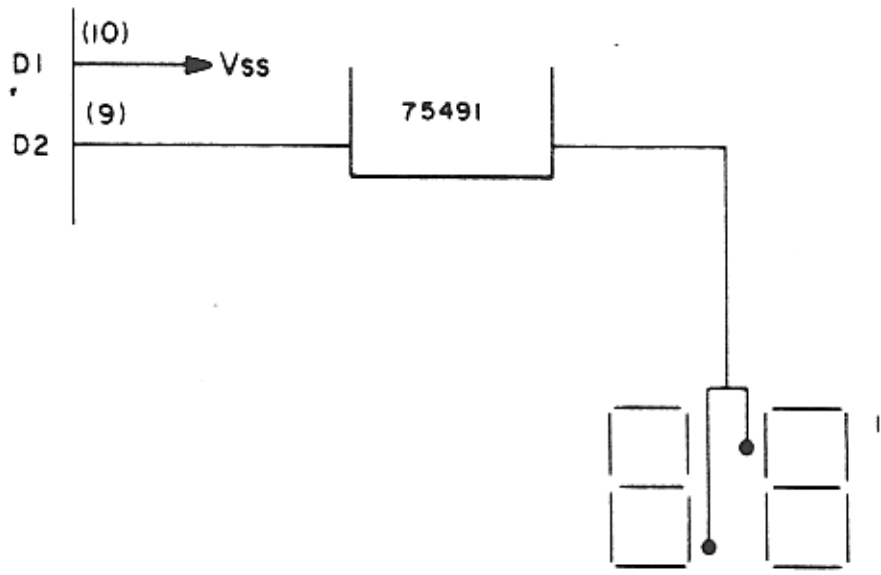
The intensity can be controlled either manua automatically (see "Automatic Intensity Control" diag

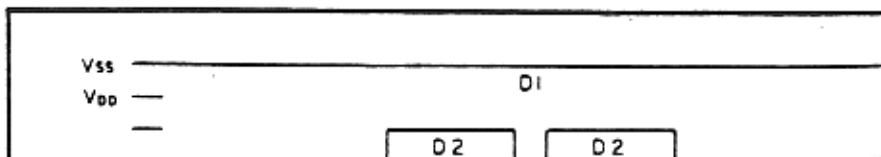
The display can be blanked by connecting the Display input to V_{DD}. Leaving this pin open allows internal pul V_{SS} which enables the display. This feature allow display to be time shared with other information.

When power is initially applied, both real time and alar will be at 12:00:00 midnight in the 12 hour mod 00:00:00 in the 24 hour mode. Time keeping begins Hours Set and Tens Minute set are simultaneously ta V_{SS}. The units minutes digit can be advanced at a 2Hz connecting both the Hours Set pin and the Tens Minu pin to V_{SS}. This also resets seconds to zero. The Tens M digit will advance at a 2Hz rate when the Tens Minute S is connected to V_{SS}. The hours digit will be advan connecting the Hr. Set pin to V_{SS}. The carry from one the next more significant digit does not occur so should be performed from the least significant digit most significant. Both pins have internal pull-down re and can either be left open or tied to V_{DD} when not used.

The chip can be used with either a 4- or 6-digit display. D_1 and D_2 are not used to display seconds and t seconds, the user is unable to tell if the circuit is activ the minutes digit changes. In order to more quickly dete clock activity, a colon or other indicator can be flashed a rate by connecting D_1 to V_{SS}. D_2 can then be used t the colon or activity indicator. The D_2 output used mode occurs during D_4 and D_5 time so that the decima for digits D_4 and D_5 can be used as a colon.

OPTIONAL ACTIVITY INDICATOR AND TIMING





The AM/PM output operates with an 85% duty cycle at full intensity and conducts to V_{SS} for PM indication.

If a "brown out" occurs, the AM/PM indicator will flash at a 1Hz rate to signify an incorrect display time. This low power indication continues until proper power is restored and the clock is reset.

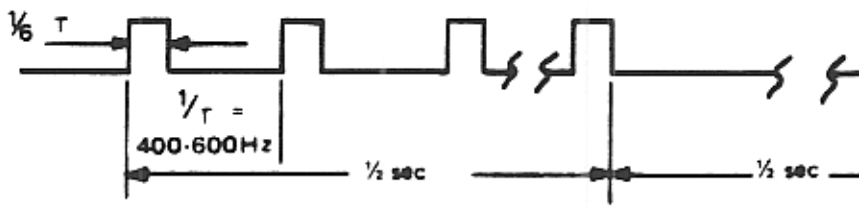
The Hours/Hz Select input is provided with an internal pulldown resistor to V_{DD}. The options available are as follows:

Part	Hours/Hz	Mode
MK50250	Open to V_{DD} V_{SS}	60Hz - 12 Hrs. 50Hz - 24 Hrs.
MK50253	Open or V_{DD} V_{SS}	50Hz - 12 Hrs. 50Hz - 24 Hrs.
MK50254	Open to V_{DD} V_{SS}	60Hz - 12 Hrs. 60Hz - 24 Hrs.

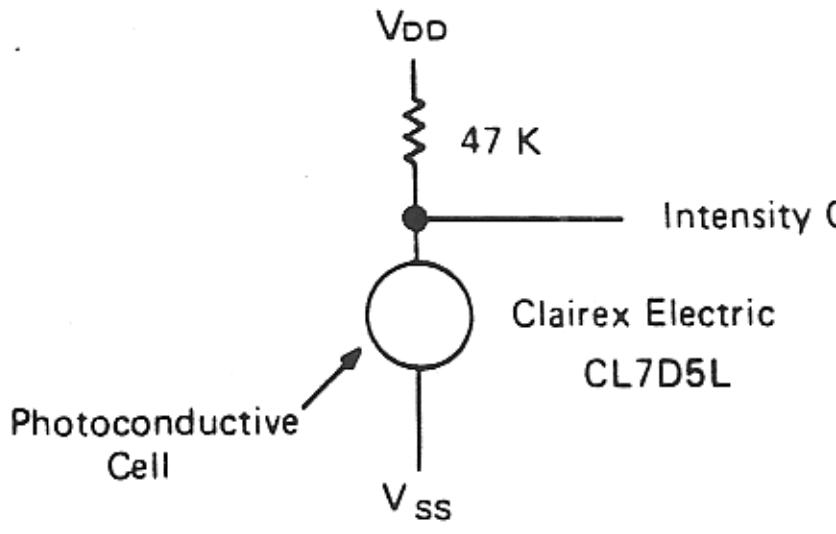
The Alarm Enable pin enables the alarm when connected to V_{SS}. If it is left open, it will disable the alarm due to an internal pull-down resistor to V_{DD}. When alarm occurs it may be disabled and immediately re-enabled and will activate 24 hours later at the alarm time. The output tone will be in the range of 400-600Hz, and has a 1/6 duty cycle which conducts to V_{SS} 50% of the time at a 1Hz rate.

The Snooze feature will temporarily turn off an a alarm signal to allow an additional 10 minutes Momentarily connecting snooze to V_{SS} will activ snooze. If left open, an internal pull-down resistor to V maintain the snooze feature inoperative.

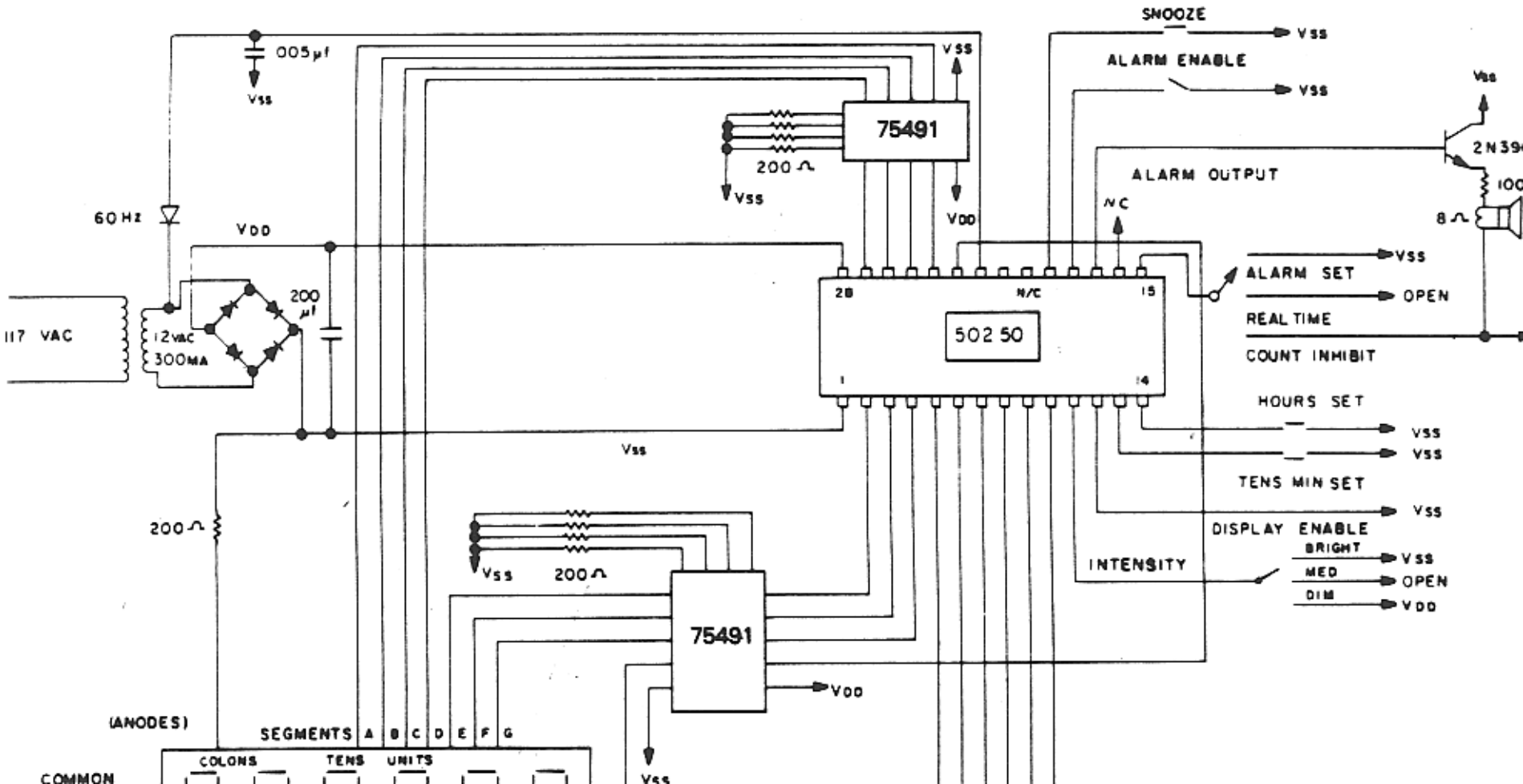
ALARM OUTPUT



AUTOMATIC INTENSITY CONTROL



TYPICAL CIRCUIT CONFIGURATION



JAMECO
ELECTRONIC COMPONENTS
COMPUTER PRODUCTS

Part No. 82481
0.5" Blue Green 4 Digit Clock Display
Addendum

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